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(56) Documents Cited

None

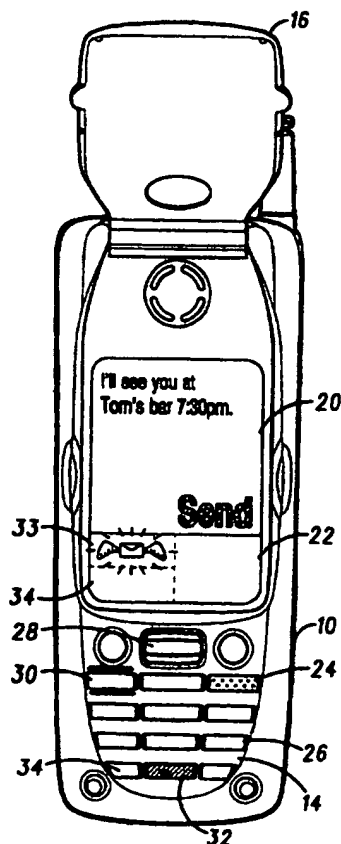
(58) Field of Search

UK CL (Edition O) G4H HKV  
INT CL<sup>6</sup> G06F, H03M, H04M

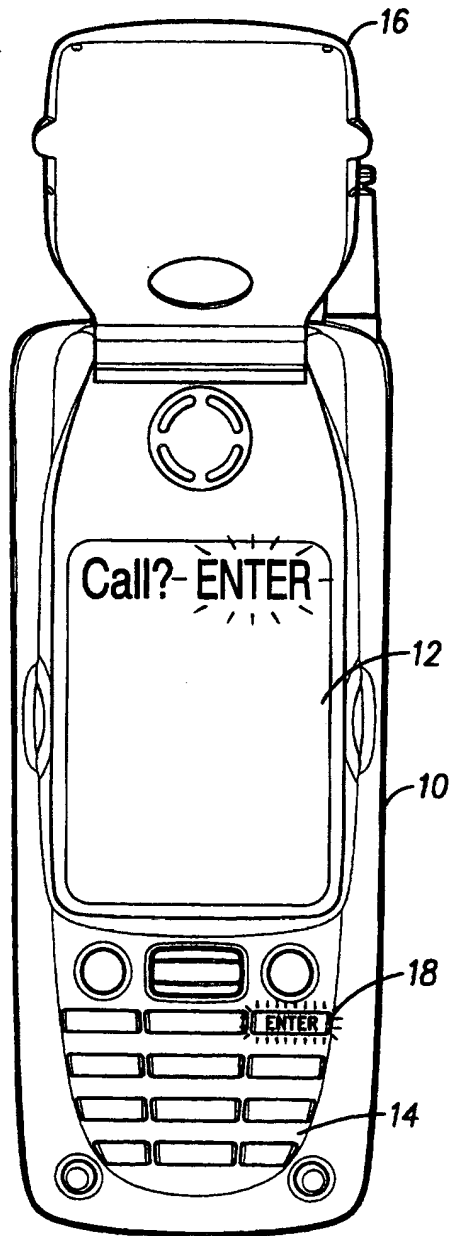
(54) Abstract Title

**Man-machine interface**

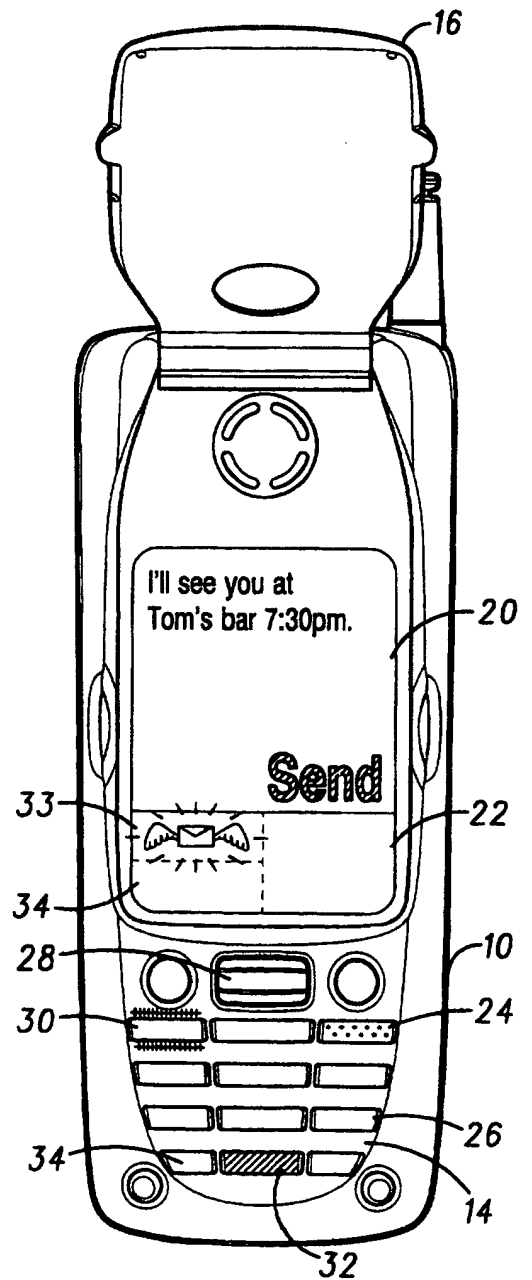
(57) For a man-machine interface (14, 20, 22) of an electronic device of FIG. 2, an arrangement of pixels (SEND) on a display (20) is altered to reflect a colour-coding scheme associated with a particular one of a plurality of input elements (32, 33) in a keypad (14) or graphics tablet (22). Alternatively, an appearance of at least one of the plurality of input elements (33), associated with the arrangement of pixels (SEND), is altered with time to facilitate its identification. In these ways, a user of the electronic device is stimulated to enter an instruction through an identified input element.



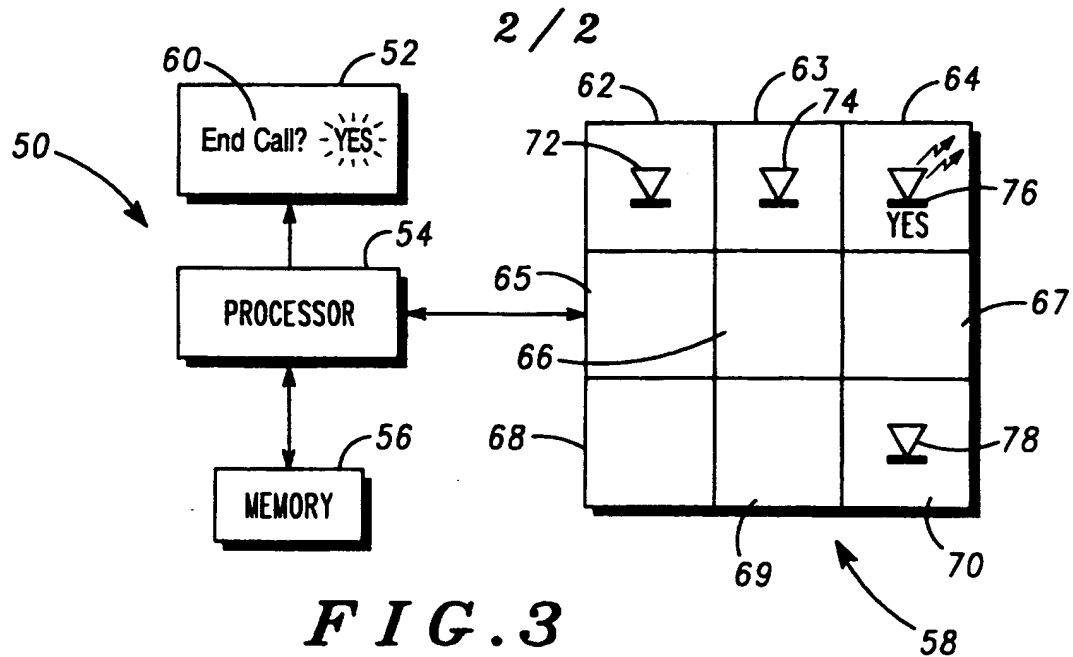
**FIG. 2**



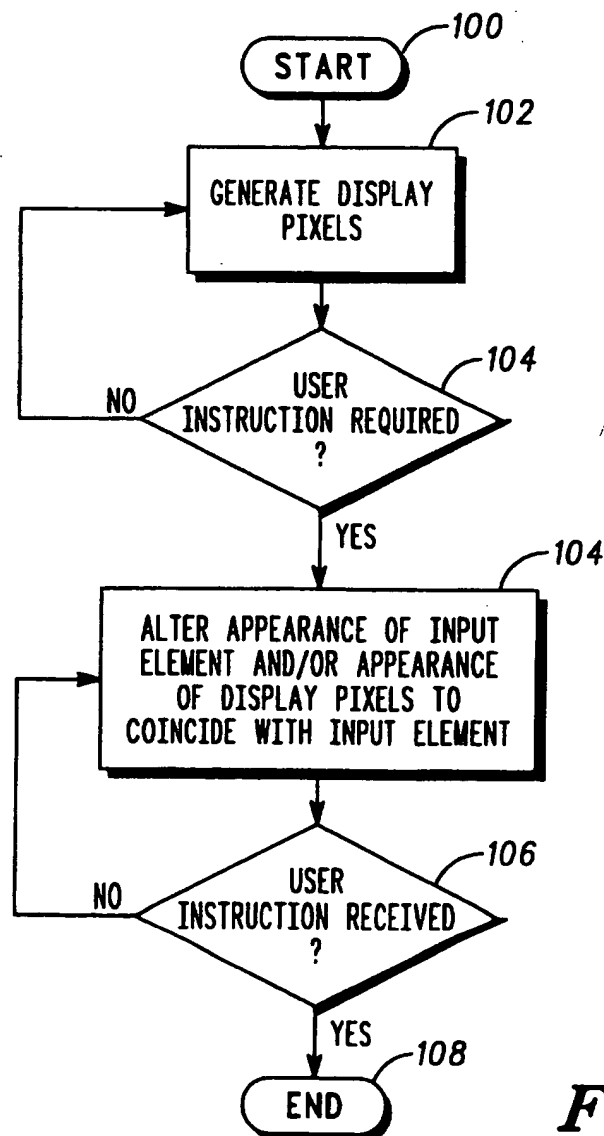
**FIG. 1**



**FIG. 2**



**FIG. 3**



**FIG. 4**

## MAN-MACHINE INTERFACE

Background of the Invention

5 This invention relates, in general, to a man-machine interface and is particularly , but not exclusively, applicable to a man-machine interface of a cellular telephone in which there is provided a guide to data entry.

Summary of the Prior Art

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Market research has indicated that "ease of use" of electronic equipment, such as cellular radiotelephones, has a substantial influence on whether the electronic equipment is purchased and whether the functionality provided within the electronic equipment is utilised to its greatest  
15 potential. Indeed, electronic equipment that is controlled intuitively has the greatest likelihood of success within the market place.

As technology has advanced, the functionality provided within such electronic equipment has increased accordingly. For example, man-  
20 machine interfaces (i.e. the data input interface between a user of the electronic device and the device itself, e.g. a peripheral keypad or graphics tablet and a liquid crystal display (LCD)) have increased in size and complexity to accommodate the presentation and entry of more detailed user information. Within smaller electronic devices, such as cellular  
25 radio telephones, some functional (operational) tasks, e.g. initiating a call or accessing an electronic phone book, are activated by a user in response to direct data entry; with selection of a task achieved following navigation to an appropriate software function in a hierarchical menu scheme in which the user is presented with visually displayed instructions. Within  
30 such hierarchical menus, it is not unusual for smaller electronic devices (on which space is limited) to have a multi-function "soft-key" that performs different data input instructions according to the software function selected from the menu, e.g. a single button such as "enter" may execute call establishment and call termination while another soft-key  
35 may control ring-tone volume, address book access and memory retrieval of data stored from short messaging services (SMS) or the like.

In relation to personal computers, operating system or application software is sometimes designed to instruct a user to make a keyboard entry to initiate a software command. For example, when copying a file from a hard disk to a floppy disk, the operating system of the personal computer  
5 may indicate that the file transfer can be suspended or terminated by the user depressing a combination of special character keys. However, the user of the personal computer must be familiar with the keyboard layout of the man-machine interface in order to locate and execute the combination of special characters keystrokes before the function is completed.

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### Summary of the Invention

According to a first aspect of the present invention there is provided a man-machine interface of an electronic device having: a display for  
15 displaying an arrangement of pixels; an adaptive input device containing a plurality of input elements for entry of instructions to the electronic device; and a processor responsive to the instructions and arranged to control the arrangement of pixels to be displayed on the display, wherein an appearance of at least one of the plurality of input elements, associated  
20 with the arrangement of pixels, is altered with time by the processor to facilitate identification of said at least one of the plurality of input elements thereby to stimulate entry of an instruction via said at least one of the plurality of input elements.

25 In a second aspect of the present invention there is provided a man-machine interface of an electronic device having: a colour display for displaying characters in differing colours; an input device containing a plurality of input elements for entry of instructions to the electronic device, at least one of said input elements having a colour-coding scheme  
30 associated therewith and being arranged to perform a soft-key function whereby a plurality of operations are executed by the electronic device in response to entry of an instruction via said at least one of the input elements; and a processor responsive to the instructions and arranged to generate the characters to be displayed on the display, wherein the  
35 processor is arranged to generate at least some of the characters in the colour-coding scheme associated with said at least one of the input elements to stimulate entry of an instruction via said at least one of the input elements.

Exemplary embodiments of the present invention will now be described with reference to the accompanying drawings.

5 Brief Description of the Drawings

FIG. 1 illustrates an electronic device having a man-machine interface constructed in accordance with a preferred embodiment of the present invention.

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FIG. 2. is a representation of an electronic device with a man-machine interface according to the present invention.

FIG. 3 is a simplified diagram of a man-machine interface of the present  
15 invention.

FIG. 4. is a flow diagram illustrating operation of the man-machine interface of the present invention.

20 Detailed Description of a Preferred Embodiment

Referring to FIG. 1, there is shown an electronic device 10 having a man-machine interface according to a preferred embodiment of the present invention. For exemplary purposes, the electronic device 10 of  
25 FIG. 1 is shown as mobile radiotelephone having a display 12, such as an LCD display, and a keypad 14 comprising a plurality of input keys (thirteen are shown for the purposes of illustration only, although it will be appreciated that the keypad could contain substantially fewer or substantially more keys). In the mobile radiotelephone of FIG. 1, the size of  
30 the display 12 warrants some form of protection and to this effect a protective closure member 16 is hinged at the top of the telephone and is moveable to cover the display 12.

The display 12 can be seen to be presenting a request for the input of an  
35 instruction from a user of the electronic device 10. Particularly, in addition to the request "Call?" (illuminated on the display 12 by the microprocessor controlled energisation of appropriate pixels in the display, as will be understood by the skilled addressee), the word "ENTER"

is also generated on the display 12 to prompt a user to depress a corresponding ENTER key 18 associated with executing the command.

5 According to the present invention, the man-machine interface is in some way altered when keystroke entry is required. For example, in a first aspect of the present invention, the pixels that are energised to display the word "ENTER" are altered in appearance compared with those pixels energised to display the question "Call?". In these respects, the alteration of the pixels in the word "ENTER" can be a colour change and/or a pulsed energisation of the pixels that form the word "ENTER". Simultaneously, to  
10 stimulate a user to perform a required keystroke entry (via the appropriate key or combination of keys on the keypad 14), the appropriate key (in this case the ENTER key 18) is correspondingly coded with: i) the colour used to display the word "ENTER"; and/or ii) is backlit or otherwise illuminated (e.g. by pulsing a light emitting diode located behind the ENTER key 18 or  
15 by changing the colour in which the key is illuminated to a similar colour to that used to display the word "ENTER" on the display). In this way, a user is encouraged in an intuitive fashion to depress the ENTER key 18 as a consequence of association and/or visual stimulation.

20 In the case of the permanent colour coding of a particular key (or combinations of keys) on the keypad, colour coding may be applied to a surface of the key or in close proximity to the key, i.e. to an area surrounding the key.

25 FIG. 2 illustrates an alternative form to the man-machine interface shown in FIG. 1. Again, as in FIG. 1, an electronic device 10 can be seen to comprise a keypad 14 (which in this case may be optional because its function may be redundant). The keypad comprises a plurality of keys  
30 24-34, some of which may be permanently colour coded (e.g. keys 24, 30, 32) in accordance with the foregoing description. Instead of or supplementary to a display 20, the electronics device 10 further comprises a graphics tablet 22 that can be adaptively altered to display information and to accept data that can be input by virtual of the graphics tablet having a touch-sensitive  
35 input matrix, as will be understood. The graphics tablet 22 (like the display 12 of FIG. 1) is under the control of a microprocessor (not shown). The keypad or graphics tablet 22 may also comprise a soft-key 28 that performs a variety of functions in a variety of different operating modes, which

soft-key may be coded according to the various aspects of the present invention.

Looking specifically at the information presented by electronic device 10 of  
5 FIG. 2, a short message (provided by a suitable telecommunications  
service) is displayed either on the display 20 or on a particular portion of  
the graphics tablet 22 and reads "...and I'll see you at Tom's Bar 7.30pm".  
On another area of the display 20 (or graphics tablet 22), the instruction  
10 "SEND" is formed from illuminated pixels, and is coded with a colour  
corresponding to key 32. For the sake of graphical representation, the  
hatching of key 32 and the instruction "SEND" is used to represent a  
particular colour while the polka-dot pattern of key 24 represents a  
different colour.

15 The present invention therefore awaits a user to depress the  
correspondingly coded SEND button (in this case key 32) before activating  
the send function. Alternatively, if the send button is displayed on a  
graphics tablet 22, touching "SEND" on the graphics tablet may also  
activate the send function. Additionally, the graphics tablet 22 may contain  
20 dedicated segments 33-34 for data display and data entry, which segments  
may normally be left vacant of information and then selectively energised  
to display colour coded and/or pulsed icons that indicate the requirement  
for user input. For example, send could be represented by a flashing  
'winged-envelope' that periodically appears in segment 33 of the graphics  
25 tablet 22.

Turning now to FIG. 3, a simplified diagram of the man-machine  
interface 50 of the present invention is shown. The man-machine interface  
50 comprises a display 52 that is coupled to a processor 54. The processor is  
30 further coupled to both a memory 56 and a keypad or graphics tablet 58.  
The graphics tablet or keypad 58 contains a number of discrete sectors  
62-70 that have pixels or light emitting diodes 72-78 that can be selectively  
energised by the processor 54. For the sake of illustration only, four sectors  
are illustrated as containing pixels or light emitting diodes. The processor  
35 54 controls the operation of the man-machine interface 50 by executing  
software functions stored in memory 56. Occasionally, the processor 54 is  
required to display information 60 on the display 52, and therefore  
generates an instruction to prompt a user to perform a particular data



entry via a keystroke. In the case of FIG. 3, the message displayed by the processor 54 is "End Call?", while the prompt that is displayed is "YES". The pixels that form the prompt are selectively energised by the processor 54. Simultaneously, the processor 43 controls the energisation of  
5 pixels or light emitting diodes 72-78 that appear beneath discrete sectors of the keypad or graphics tablet 58 that correspond to an input instruction of "YES".

FIG. 4. is a flow diagram illustrating operation of the man-machine  
10 interface of the present invention. At 100, the process starts. A processor in an electronic device is arranged to display messages by illuminating pixels at 102, and then determines whether a user instruction is required at 104. In the negative, the processor continues to generate display pixels (to provide a 'comfort message' to the user that the device is active). In the  
15 affirmative, however, the processor causes the alteration of the appearance of an input element and/or the display pixels so that a visual similarity (or an alteration in the man-machine interface) occurs. The processor continues to maintain the altered appearance of the man-machine interface 106 until it receives a required user instruction,  
20 which instruction is manually input by a user through a keypad, a graphics tablet or the like. The input-prompt process then ends at 108.

The present invention therefore advantageously provides a man-machine interface that can be adaptively changed to prompt a user to input specific  
25 instructions in an intuitive fashion.

Claims

1. A man-machine interface of an electronic device having:  
a display for displaying an arrangement of pixels;  
5 an adaptive input device containing a plurality of input elements for entry of instructions to the electronic device; and  
a processor responsive to the instructions and arranged to control the arrangement of pixels to be displayed on the display, wherein an appearance of at least one of the plurality of input elements, associated  
10 with the arrangement of pixels, is altered with time by the processor to facilitate identification of said at least one of the plurality of input elements thereby to stimulate entry of an instruction via said at least one of the plurality of input elements.
- 15 2. The man-machine interface of claim 1, wherein adaptive input device is one of a keypad and a backlit graphics tablet, and wherein the processor causes the appearance of said at least one of the plurality of input elements to alter by illumination of said at least one of the plurality of input elements.
- 20 3. The man-machine interface of claim 2, wherein the processor causes pulsed illumination of the at least one of the plurality of input elements.
- 25 4. The man-machine interface of claim 2 or 3, wherein the illumination is coloured.
5. The man-machine interface of claim 2, 3 or 4, wherein the illumination is proximate to the at least one of the plurality of input  
30 elements.
6. The man-machine interface of claim 2, 3 or 4, wherein the illumination is within the at least one of the plurality of input elements
- 35 7. The man-machine interface of any one of claims 2 to 6, wherein the arrangement of pixels displayed and the appearance of the at least one of the plurality of input elements correspond.

8. The man-machine interface of any preceding claim, wherein the electronic device is a cellular phone.

5 9. A man-machine interface of an electronic device having:  
a colour display for displaying characters in differing colours;  
an input device containing a plurality of input elements for entry of  
instructions to the electronic device, at least one of said input elements  
having a colour-coding scheme associated therewith and being arranged  
to perform a soft-key function whereby a plurality of operations are  
10 executed by the electronic device in response to entry of an instruction via  
said at least one of the input elements; and  
a processor responsive to the instructions and arranged to generate  
the characters to be displayed on the display, wherein the processor is  
arranged to generate at least some of the characters in the colour-coding  
15 scheme associated with said at least one of the input elements to stimulate  
entry of an instruction via said at least one of the input elements.

20 10. The man-machine interface of claim 9, wherein the characters  
comprise a symbol.

11. The man-machine interface of claim 9, wherein the characters  
comprise a word.

25 12. A man-machine interface substantially as hereinbefore described  
with reference to the accompanying drawings.



Application No: GB 9704938.1  
Claims searched: 1-12

Examiner: Mike Davis  
Date of search: 10 June 1997

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G4H (HKV)

Int Cl (Ed.6): H03M, H04M, G06F

Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
	None	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.